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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

OCT 29 1976

H. Stuart Cunningham, Clerk
United States District Court

THE MAGNAVOX COMPANY,
a Corporation, and
SANDERS ASSOCIATES, INC.,
a Corporation,

Consolidated Civil
Actions No. 74 C 1030
No. 74 C 2510

Plaintiffs, :

-v-

CHICAGO DYNAMIC INDUSTRIES,
INC., a Corporation,

DEPOSITION OF

BERNARD J. LECHNER

Defendant. :

Transcript taken in the above-entitled
matter before Guy J. Renzi and Edwin Silver, Certified
Shorthand Reporters and Notaries Public of the State of
New Jersey at 824 West State Street, Trenton, New Jersey
on Thursday, October 28, 1976, commencing at 9:15 A.M.

A P P E A R A N C E S

MESSRS. NEUMAN, WILLIAMS, ANDERSON & OLSON
Attorneys on behalf of Plaintiffs
BY: THEODORE W. ANDERSON, ESQ. and
JAMES T. WILLIAMS, ESQ.

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Inc. and Worldwide Distributors, Inc.

EDWARD C. THREEDY, ESQ.
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I N D E XWITNESSPAGE

BERNARD J. LECHNER

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1 B E R N A R D J. L E C H N E R, sworn by the
2 Notary and testified as follows:

3 DIRECT EXAMINATION
4 BY MR. GOLDENBERG:

5 Q Mr. Lechner, would you state your full
6 name as you ordinarily use it in business and your
7 residence address, please?

8 A Yes. My full name as I ordinarily use it is
9 Bernard J. Lechner and my residence address is
10 Cleveland Road, Rural Delivery 2, Princeton, New
11 Jersey.

12 Q Are you employed, sir?

13 A Yes.

14 Q By whom?

15 A By the RCA Corporation.

16 Q How long have you been employed by RCA?

17 A Since June of 1957.

18 Q Could you state your education after high
19 school naming institutions that you attended, the
20 years that you were there, major courses of study and
21 degrees received, if any?

22 A I graduated from New Rochelle High School in
23 June of 1949 and entered MIT as a freshman in the
24 fall of 1949. I was at MIT for one semester, the
25 fall of '49, until January of 1950. I returned

1 to MIT in the fall of 1950 and was there for one
2 full academic year until the summer of 1951, would
3 that be -- yes, the fall of '50 to the summer of
4 '51.

5 I then entered Columbia University in the fall
6 of 1952 and was there for one semester, at which
7 point I went into the Army.

8 When I returned from the Army in January of
9 1955 I re-entered Columbia and was a student there
10 continuously until the summer of 1957 when I
11 received my Bachelor of Science Degree in Electrical
12 Engineering.

13 Subsequently while employed by RCA between 1957
14 and 1960 I was a part-time student at Princeton
15 University. Part-time from '57 through '59, and
16 then essentially full-time on leave of absence from
17 RCA -- no, I wasn't really on leave of absence,
18 it was a special program. I guess I was still
19 carried as a full employee but I was not being paid
20 full salary. I was receiving partial salary during
21 that year from 1959 to 1960. And I studied, did
22 graduate work in electrical engineering from Princeton,
23 but I have no degrees from Princeton.

Lechner - direct

1 Q What was your experience while you
2 were in the Army?

3 A I entered the Army as a draftee, so as a
4 Private E-1, went through basic training at Camp
5 Gordon, Georgia, which at that time was one of the
6 principal basic training sites for people who were
7 destined to be members of the Signal Corps.

8 After completing the basic training period in
9 the spring of 1953, I was transferred to Fort Monmouth,
10 New Jersey, with the intention that I would take a
11 33-week, or 39-week--33- or 39-week signal school
12 course in microwave radio repair, I think was the
13 title of the program. However, since I had some
14 advance knowledge of electronics, having worked with
15 electronics as a hobbyist through high school and
16 having studied electrical engineering at MIT, and
17 also having worked as a television serviceman
18 during the period between 1949 and 1953, when I was
19 not a student, I was able to obtain an advance
20 standing in that course by taking the weekly examina-
21 tions for the first 25 or 27 weeks, or something of
22 that order. And so I entered the course not at
23 week one, but at week 20-something--I don't remember
24 exactly where it was. And after completing the
25 remaining eight or ten weeks, whatever the exact

1 number was, I became an instructor in the signal
2 school at Fort Monmouth and taught that same course,
3 or taught portions of that same course. I taught
4 different weeks at different times. The practice
5 was that an instructor taught one week and started
6 the same week over again the following Monday
7 morning. But I didn't teach the same week the entire
8 time, until the end of 1953.

9 In December of 1953 I was transferred to the
10 315th Signal Battalion Headquarters, in Karlsruhe,
11 Germany, and spent the remainder of my army career
12 there, another year, from January of '54 to January
13 of '55, when I was honorably separated from the
14 service. And what I did there initially was to take
15 a short course that was offered on some specific
16 equipment that the 315th Battalion maintained in
17 Germany and France. This was a microwave telephone
18 link system that ran all over Western Germany and
19 parts of France.

20 After taking that course and participating in
21 a field maneuver that related to that kind of
22 equipment, I became an instructor in that school;
23 and for the remainder of that year, from I guess
24 sometime in March or April of '53--March or April of
25 '54 until January of '55, I taught that course in

Karlsruhe, Germany.

Q Thank you, sir.

Could you tell me once again when you joined RCA?

A Yes. In June of 1957. I don't remember the exact date, but it was on a Monday.

Q What is the title of your present position with RCA? What generally are your duties at this time?

A I'm presently the head of our colored television research group at the laboratories in Princeton. And in that position I supervise--

May I have a momentary conference with--

Q Yes, sir. And I will tell you right now, don't tell us any information that you consider proprietary to RCA about its current developments.

A Yes. My concern--

Can we go off the record for a moment?

MR. GOLDENBERG: We can be off the record, surely.

[Off the record.]

Lechner - direct

1 A My duties are to supervise the research activities
2 of between 20 and 25, I don't again remember the exact
3 number of members of the technical staff, and
4 approximately an equivalent number of supporting
5 research technicians, research associates and
6 technical staff associates.

7 Q And this is in connection with color
8 television development?

9 A That's correct.

10 Q Generally?

11 A That's correct.

12 Q Were you employed by RCA in the calendar
13 year 1967?

14 A Yes, I was.

15 Q Could you tell us what position you held
16 at that time and generally what your duties were?
17 And if they changed in the course of the year,
18 could you so indicate?

19 A Yes. At the beginning of that year I was the
20 head of a group concerned with doing research on
21 digitally addressed matrix displays. And I don't
22 remember the exact title of the group, but it
23 probably included the words display or matrix --
24 no, probably display and maybe digital.

25 At that time I reported to Dr. Ian Rajchman

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1 and the laboratory that he headed was called, if I
2 remember correctly, the Computer Research Laboratory.
3 It may have been Computer Systems, but approximately
4 Computer Research Laboratory.

5 Sometime during the summer of 1967, and again
6 I do not remember the exact date, we had a
7 reorganization at the laboratories and a new
8 laboratory was created called the Computer Applied
9 Research Laboratory, and the other computer labora-
10 tory, which I imagine remained known as the Computer
11 Research Laboratory, continued under Dr. Rajchman;
12 but this new laboratory was headed by Dr. William
13 Webster who was the Acting Director of that
14 laboratory at that time.

15 And I and my group moved from Dr. Rajchman's
16 laboratory to Dr. Webster's laboratory. And I
17 believe the title of the group was changed. It may
18 not have been changed at exactly that moment,
19 it may have been changed later in the year, to the
20 Peripheral Equipment Research Group.

21 Q How do you spell Dr. Rajchman's name?

22 A R-a-j-c-h-m-a-n.

23 Q Could you tell us what digital address
24 matrix displays are?

25 A Yes. They are displays which have, in the

1 context that I used the term before anyway, they
2 are displays that have a rectangular array in
3 general, or in general an orthogonal array since
4 it could be rho and theta, as well as X and Y, having
5 at each point a discrete element capable of
6 producing light.

7 Those elements being addressed or controlled by
8 the coincidence of orthogonal signals applied to,
9 for example, the X and Y lines. It is a display
10 that is electrically organized very much like a
11 computer memory in that the individual points are
12 excited only when there is coincidence of signals
13 on the two orthogonally exposed addressing lines.

14 There are many examples of those kinds of
15 displays that have been worked on at RCA and many
16 other companies over the years.

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Lechner - direct

1 Q Could you give some examples, sir?

2 A Yes. One example would be a faro electro-
3 luminescent display which we worked on during the
4 period from the early 1960's until about 1966.
5 This was a display that had 1200 discrete electro-
6 luminescent patches; they were approximately a
7 quarter of an inch square. Each controlled by a
8 faro electric element, and those faro electric
9 elements arranged in a matrix of 30 by 40 elements
10 and addressed by those seventy sterile leads. This
11 display was constructed under an Air Force contract
12 and was capable of producing a moving half-tone
13 image generated by a TV camera.

14 MR. TRIPOLI: Off the record.

15 [Discussion off the record.]

16 Q Could you describe briefly any other
17 types of digitally addressed matrix which you are
18 familiar with in this period 1967?

19 A There had been some 10 years earlier a matrix
20 display also using electro-luminescent elements that
21 was controlled by magnetic elements. That was also
22 1200 elements and it was also done at RCA Laboratories.

23 Q When there was this reorganization in
24 1967 and your group had the title changed to something
25

Lechner - direct

1 involved in peripheral equipment, was there any
2 change in the areas of technical or scientific
3 inquiry that you were doing at that time; or was it
4 still this digital address matrix displays?

5 A No, there was a change. The intent--one of
6 the intents of that reorganization was to broaden
7 the scope of the activities in which my group
8 participated to include other things besides the
9 digitally addressed matrix displays, although we
10 continued to work on them, too.

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Lechner - direct

1 Q Did your group have any responsibilities
2 for investigations into any other kind of displays?

3 A Yes. There was a project that had been
4 begun before this reorganization. But at the time
5 of the reorganization, that project came under my
6 supervision and it was concerned with using a
7 storage type tube in a computer peripheral type
8 display.

9 Q Was this storage type tube of the
10 generic group that we would call a cathode ray
11 tube?

12 A Yes.

13 Q What generally was the purpose at that
14 time in investigating the use of that type of tube?

15 A The purpose was to provide a computer
16 peripheral that would allow interactive graphics.

17 Q Interactive between what and whom, sir?

18 A Well, between the user, who might be an
19 engineer, or businessman, depending upon the
20 particular application, and the computer which was
21 to contain some data base relating to whatever
22 problem or application that the user was attempting
23 to pursue.

24 Q Were you or somebody working for you
25 personally involved in that particular activity?

1 A Yes. People working for me were personally
2 involved, and I was involved as a supervisor.

3 Q Could you tell us who those people were,
4 sir?

5 A Yes. The principal people involved in that
6 program were James Miller, James C. Miller and
7 Charles M. Wine, and -- well, those were the
8 principal people. There were some other people who
9 may have had minor temporary involvements.

10 Q This was in 1967?

11 A And prior, yes.

12 Q And prior.

13 A They came under my supervision during 1967,
14 but they had been working on that project for some-
15 time earlier.

16 Q There has been testimony that Mr.
17 Alfred Teger was also involved in activity with
18 respect to a cathode ray tube and graphics. Is the
19 activity you have just described with respect to
20 your groups a separate activity from that of Mr.
21 Teger?

22 A Yes, it was a separate activity.

23 Q When did this activity begin?

24 MR. TRIPOLI: Excuse me. This activity?
25 Which one of the two activities?

1 Q The activity under your supervision with
2 respect to the storage type tube.

3 (Off the record.)

4 A I can't remember exactly when that began. The
5 work was certainly underway during 1966. It may have
6 begun earlier than that. It may have begun in
7 1965, but I am not certain. I'd have to dig into
8 some things, talk to some people to find out
9 exactly when.

10 Q In the course of this investigation, what
11 kind of device was supplying input information to the
12 storage tube?

13 A The input information originated in a time-share
14 computer and came via a telephone line to some
15 terminal electronics, which were electronics that
16 had been designed by the people working on that
17 program, principally Mr. Miller and Mr. Wine.

18 The terminal electronics interpreted the signals
19 from the computer and generated the necessary
20 x, y and z signals for the storage tube.

21 Q What was the nature of the scanning in the
22 storage tube?

23 MR. ANDERSON: I object. There is no
24 foundation for that question whatsoever.
25 There has been no discussion of scanning of a

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Lechner - direct

storage tube, that I know of, in this record.

Q In order to display the information, did the storage tube include an electron beam?

A Yes, it did.

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3 1/2 plots.

19 The plot is also a scan, that is,

20 the basic character of the

21 the form of the data after

22 the data is scanned and

23 the data is scanned and

24 graphs of the data are

25 might be related to business type

1 Q Was that beam scanned over the screen
-1 2 or face of the storage tube?

3 A The beam was moved from one point on the face
4 of the tube to another point, from one set of XY
5 coordinates to another set of XY coordinates in
6 response to signals applied to the deflection
7 electrodes of the storage tube.

8 Q Do you know of any particular term used
9 in the art to describe that method of moving an
10 electron beam?

11 A Basically it is what you would call a point-
12 to-point or a vector-type of display.

13 Q What kind of displays were being dis-
14 played? What was their nature? I am not talking
15 about the device itself, but what typically was
16 being displayed on the face of this tube?

17 A Many things. I will give you two or three
18 examples.

19 Alpha numerics were created, that is,
20 alphabetic and numeric characters by making the
21 beam trace out the specific form of the character.
22 Also graphical entities, things that one might
23 typically find in engineering drawings, for example.
24 Graphs of mathematical equations. Bar graphs that
25 might be related to business type applications.

Lechner - direct

1 Geometric patterns of simply an abstract nature to
2 sort of demonstrate to the layman the capability of
3 the display to produce complex graphics. And to
4 demonstrate the interactive nature, again to the
5 layman, some simple games were programmed to be shown
6 on the display.

7 Q Could you tell us what those games were,
8 sir?

9 A The one that I remember specifically was
10 a maze type game. The display created a rectangular
11 box and the object from the interacting player's
12 point of view was to move from the lower left-hand
13 corner to the upper right-hand corner by either moving
14 horizontally or vertically without running into any
15 walls of the maze, but the walls were not presented
16 to him when he started, so he had to make a guess,
17 for example, in the lower left-hand corner whether
18 to move up or whether to move to the right. If there
19 was a wall above him, he would hit it and lose a
20 point. If there was a wall to the right, he would
21 hit it and lose a point. If there were not a wall,
22 a line would be drawn on the face of the screen
23 indicating that he had successfully moved from that
24 point to a point one unit above or one unit to the
25 right of his starting point, and he then had to make

1 another guess, and so forth. And the scoring of
2 the game was determined by how many false steps
3 he had taken before he reached the final point.

4 There were various ways of doing it. There was
5 also a time out arrangement. There were cases where
6 the walls would be drawn in. There were many
7 different ways in which the actual interaction
8 occurred, but the basic object of the game was to
9 work one's way through this invisible maze.

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1 Q Was the maze ever displayed on the face
2 of the tube?

3 A Oh, yes.

4 Q At what point of the game was it displayed?

5 A There was more than one condition under which the
6 maze could be displayed, depending on whether one
7 had chosen the easy or the hard modes of playing the
8 game.

9 I'm trying to remember exactly how one of those
10 modes worked.

11 If my recollection is correct, in one case
12 when you hit a wall, the entire maze up to that point
13 would be drawn for you and then erased and you would
14 be put back to the beginning and had to remember
15 what you had seen of the maze thus far.

16 Certainly, when the game was completed, the
17 entire maze would be drawn to show you whether you
18 had taken the only path or the simplest path or the
19 more complicated path.

20 Some of the mazes had more than one path
21 possible from beginning to end.

22 So there were several conditions under which the
23 entire maze could be displayed.

24 Q How was the movement of the player
25 represented on the face of the tube?

Lechner - direct

A By the drawing of a line segment from the point, starting point that he had been at to the new point that he chose, whether it be above, the right, to the left or below the point he started from.

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Q Would this be a correct understanding, is the player --

MR. ANDERSON: I object to your stating on the record your understanding. Ask the witness questions and he will answer them.

I don't think the record is concerned with your understanding of the facts, it is the witness's understanding.

MR. GOLDENBERG: I think that's what we have, sir, and I am trying to see if my characterization of it is correct. If the witness disagrees, he will so state.

MR. ANDERSON: I do not think it is appropriate for you to characterize his testimony and I object to it.

MR. GOLDENBERG: I don't think it is inappropriate at all. If it is inaccurate, it is certainly inappropriate and I will be corrected by the witness.

MR. ANDERSON: I object to your stating on the record your understanding of the testimony

1 or the facts, whether your understanding is
2 correct or incorrect.

3 MR. GOLDENBERG: I think you are wrong,
4 Mr. Anderson. My sole purpose here is to
5 attempt to save time for all of the parties
6 involved because of the constraints above us.
7 If you want me to do it another way and a longer
8 way, that's what we will do.

9 MR. ANDERSON: I do want you to do it
10 another way other than stating your understand-
11 ing.

12 MR. GOLDENBERG: Well, we will try another
13 way, sir.

14 Read back the last answer.

15 (The last answer reread by the reporter.)

16 Q As the player moved across the screen,
17 were line segments continued to be drawn in
18 accordance with the path of the player?

19 A Yes
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Lechner - direct

1 Q If the player moved horizontally, would
2 there then be a horizontal line segment drawn?

3 A That's correct. The player would choose one
4 of the four directions in which he wished to move,
5 up, down, left, or right, by pushing one of four
6 keys on a typewriter keyboard, in general, or a
7 small button box that had an equivalent function.
8 And in response to that, a line segment would be
9 drawn in one of those four directions, would then
10 make another choice, and the process would be
11 repeated, unless he hit one of the invisible walls.

12 Q Did the player have any control over
13 the length of this line segment each time he pushed
14 a button?

15 A No. The line segment was of a fixed length.

16 Q If he wanted to move a further distance
17 in the same direction which he had chosen, how could
18 he do that?

19 A By re-entering the same command. If he had
20 moved to the right, let's say, by pushing the key
21 at that time requested that motion, he would simply
22 push it again and there would be another line
23 segment drawn in that same direction.

24 Q Suppose a player succeeded in going from
25 one corner to the other corner to win the game?

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1 What then would he see on the face of the cathode
2 ray tube?

3 MR. ANDERSON: I object to this question
4 and the line of inquiry as being outside the
5 scope of the testimony that you were authorized
6 to take by Judge Grady's order, outside of the
7 scope of the subpoena and the notice, and
8 irrelevant.

9 MR. GOLDENBERG: The order by Judge
10 Grady, that I don't think either one of us have
11 seen yet in written form, is, as I recall it,
12 on the day on which he authorized the taking
13 of this discovery was an authorization to the
14 parties to take discovery with respect to
15 RCA activities, and that's precisely what we
16 are doing; and clearly, it is most relevant
17 to the issues in this lawsuit and I believe
18 appropriate.

19 MR. ANDERSON: Well, I don't know to what
20 you are referring. All I have is a copy of
21 your notice of taking deposition, which I
22 understood was the basis on which you moved
23 for leave to take this discovery. And it
24 refers specifically to an open house, its
25 nature and purpose, "any documents describing

Lechner - direct

1 the playing of a game of pool on a cathode ray
2 tube in conjunction with any apparatus used
3 to generate and permit manipulation of the
4 symbols on the screen of the cathode ray
5 tube, including those that describe what that
6 apparatus was and how it works," and that's
7 the end of the quote from the subpoena which
8 I understand you caused to be issued, which
9 also is the basis of the notice of taking
10 depositions and the permission granted by
11 the Court to proceed here today.
12 I suggest that you restrict your questions to
13 the scope of the notice and the subpoena.
14 And if Mr. Tripoli does not object on behalf
15 of RCA, I do object on behalf of the plaintiffs.
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1 MR. GOLDENBERG: I understand, sir,
2 and I understand your objection. The fact of the
3 matter is that both of us have been surprised
4 that Mr. Lechner's testimony in the past few
5 minutes.

6 MR. ANDERSON: You mean you and Mr.
7 Threedy?

8 MR. GOLDENBERG: Were you aware of this,
9 sir?

10 MR. ANDERSON: I certainly don't think
11 you should speak on my behalf and say that I'm
12 surprised.

13 MR. GOLDENBERG: Were you aware of
14 this?

15 MR. ANDERSON: I take it, you are talking
16 about the Williams' type tube. I think it's
17 old hat, nothing new at all. It's totally
18 redundant of this record and what everybody
19 knows.

20 MR. GOLDENBERG: You will have a chance
21 to ask the witness.

22 MR. ANDERSON: Don't say I was surprised.

23 MR. GOLDENBERG: Were you surprised?
24 You can tell me that, can't you?

25 MR. ANDERSON: Surprised by what?

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Lechner - direct

1 MR. GOLDENBERG: Mr. Lechner's testimony
2 this morning.

3 MR. ANDERSON: I can't say I was
4 surprised. It doesn't surprise me at all.

5 MR. GOLDENBERG: Was this something that
6 you knew of before we came here?

7 MR. ANDERSON: What?

8 MR. GOLDENBERG: This activity that --

9 MR. ANDERSON: Storage tubes.

10 MR. GOLDENBERG: I'm talking about Mr.
11 Lechner's testimony.

12 MR. ANDERSON: My involvement in computers
13 goes way back. It's in the record of the MIT
14 storage tubes, old hat.

15 MR. GOLDENBERG: I understand that, sir.

16 MR. ANDERSON: It has very little to do
17 with the issues in this case.

18 MR. GOLDENBERG: I'm talking about this
19 maze game. Were you familiar with this before
20 we came here this morning?

21 MR. ANDERSON: I don't think that makes a
22 bit of difference. It's outside the scope of
23 what you asked permission to do. This is not a
24 fishing expedition. I don't doubt that RCA
25 made a million other in abortive efforts to

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Lechner - direct

1 find a way to do this type of thing, all
2 failures. I don't see how that bears on the
3 record, and I don't think you should be
4 entitled to fish and mislead and try to find
5 one that you like better than the ones you
6 found already. I want to get out of here
7 today.

8 We are in our second day, one working day
9 before the trial begins, and you're trying to
10 fish for a prior art in a lawsuit that was
11 filed in 1974, and I don't think it is proper.

12 MR. THREEDY: We are here by a notification
13 of you by some activity of RCA, that activity
14 which you purported to us concerned a pool
15 game.

16 Mr. Goldenberg's question was, did you
17 also know of the maze game at RCA.

18 MR. ANDERSON: We had provided you with
19 information one day after we learned of it.
20 We provided you with the means by which you
21 could investigate. We provided you with
22 everything we knew, and you came here last
23 Friday and there was never a suggestion.
24 You met with Mr. Lechner last week, you met with
25 Mr. Tripoli last week, and you met with

1 Mr. Teger last week. There's no excuse why you
2 should start the fishing expedition. You had
3 an opportunity --

4 MR. THREEDY: We are not fishing.
5 The witness has answered the questions which have
6 been raised, and some are very interesting
7 issues here.

8 MR. ANDERSON: I don't want to delay by
9 arguing, and I will stop.

10 But I protest the proceeding. I won't
11 make any further comments on the record.

12 MR. TRIPOLI: Gentlemen, the position
13 of RCA in this matter we hope has been one of
14 complete neutrality. In an effort to move these
15 proceedings, I would suggest that Mr. Lechner
16 has already testified at some length about a
17 maze game, and perhaps we ought to at this point
18 move on.

19 MR. GOLDENBERG: Mr. Tripoli, I under-
20 stand that. I do have a few more questions
21 which I will get to as quickly as I can in order
22 to wind up this maze game.

23 There are a few more questions I do have
24 with respect to it. I trust you understand why
25 we believe it to be relevant to the issues we
have

1 in our case in Chicago.

2 MR. TRIPOLI: I do not know what the
3 issues are in the case in Chicago, so I am not
4 in a position to comment.

5 MR. GOLDENBERG: If you care, I should
6 attempt to give you our position with respect
7 to them as quickly, as briefly as I can.

8 Alternatively, I would try to put the
9 remaining few questions with respect to this
10 maze game to Mr. Lechner and wind the matter
11 up.

12 MR. ANDERSON: I think the latter is the
13 appropriate procedure. We have had 80 days
14 or more of testimony in this case, and maze
15 games are in this record, if you're familiar
16 with it, and I don't know that you are.
17 I don't think you have bothered to order the
18 transcripts or look at the transcripts prior
19 to this in this case, and this is redundant to
20 what is already on the record in this case.

21 MR. GOLDENBERG: I will not respond.
22 Do not take my silence as acquiescence.
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Lechner - direct

1 BY MR. GOLDENBERG:

2 Q What apparatus was used in conjunction
3 with the cathode ray tube display in order to play
4 the maze game?

5 A There were basically four components of the
6 entire system. The display unit itself was a
7 Tektronix storage oscilloscope. This was a standard
8 commercial product available from Tektronix. I
9 don't remember the exact type number. There was
10 special electronics designed and constructed by the
11 investigators Miller and Wine to interpret digital
12 signals and supply the appropriate commands to the
13 appropriate signals to the XY and Z inputs of the
14 Tektronix storage oscilloscope.

15 There was what is called a modem, a data
16 interface to a telephone line; and there was a
17 keyboard, typically a standard typewriter keyboard,
18 but also button boxes; and there may have been a
19 joy stick--in fact, I believe there was a joy stick;
20 and, of course, the time-shared computer at the
21 other end of the phone line.

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1 Q What were the button boxes used for,
2 sir?

3 A They were used to provide a simple keyboard.
4 What happened was when you pushed a button, that was
5 an equivalent action to pushing one of the keys on
6 a keyboard, but rather than have a user have to
7 deal with the full keyboard when only a limited
8 number of commands were required for the particular
9 task he was exercising, one could use the button
10 box instead which had a few keys rather than the full
11 keyboard.

12 Q And was this when the player wanted to
13 move his position on the screen; is that when he would
14 use the button box?

15 A I believe that in conjunction with the maze
16 game we did provide the button box, but one could
17 also play the maze game by simply using the keyboard
18 and pushing appropriate keys on that keyboard
19 which were designated for the up, down, right and
20 left functions, for example.

21 Q What was the joy stick used for?

22 A It also emulated the keyboard in that it
23 provided a signal equivalent to a keyboard signal,
24 but it was used to give the user a more direct way
25 of choosing a motion on the screen. Basically, the

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1 way in which graphical entities were created on the
2 screen of the storage tube were to move in one of
3 eight directions; these were the major compass point
4 directions, up, down, right and left; and then the
5 45 degree direction in between those. And if one
6 moved the joy stick in one of those eight directions,
7 a command would be sent saying draw an incremental
8 line segment in that direction which would then be
9 drawn on the storage tube.

10 If the joy stick were held in that position,
11 the command would be repeated until the joy stick was
12 released. So one could draw a line of arbitrary
13 length in any one of those eight directions depending
14 on how long he held the joy stick in that position.
15 You could do the same thing, of course, by hitting
16 keys on the keyboard to give the same command.

17 Q Was the joy stick ever used to play the
18 maze game?

19 MR. ANDERSON: I object to the testimony

20 "play the maze game" by you, Mr. Goldenberg.

21 Q Was the joy stick ever used in conjunction
22 with the maze game?

23 A I am not certain. It may have been, but I
24 cannot recollect specifically whether it was or not.

25 Q Do you recall in what year the maze game

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1 was first played?

2 A It was certainly played during 1967. It may
3 have been played during 1966, but my recollection is
4 not that certain.

5 Q Was the maze game played at any time
6 outside of the premises of the RCA Laboratories at
7 Princeton, New Jersey on this particular apparatus
8 that you have described?

9 A Probably, but I cannot recollect a specific
10 instance at the moment.

11 Q Was the maze game ever played on the
12 premises of RCA with people other than employees of
13 RCA in attendance?

14 A Oh, yes, on a number of occasions, specifically,
15 of course, during the open house in 1967.

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1 Q You made reference to an open house in
2 1967. Could you tell me what open house you are
3 referring to, sir?

4 A Yes. This was a 25th anniversary celebration
5 that was held at the David Sarnoff Research Center
6 at the end of September, beginning of October, 1967
7 when on two days, if I recall correctly, Thursday and
8 Friday, a variety of visitors both from within
9 RCA and outside of RCA came to the laboratories and
10 witnessed a large variety of demonstrations, and then
11 on Saturday and Sunday members of the general public
12 were there and witnessed these demonstrations
13 and exhibits.

14 Q I show you a document which has been
15 marked as RCA Exhibit 1 and I ask you if you have
16 ever seen that before, sir?

17 A Yes, I have.

18 Q Could you state the circumstances under
19 which you first saw it?

20 A I saw it at the time of the open house. I
21 am not certain whether I saw it, you know, first on
22 Friday or Saturday or early that week. But sometime
23 prior to, or certainly during the open house, the
24 dates that are specified here.

25 Q Do you have any knowledge as to

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1 what organization or institution prepared the
2 original of Exhibit 1?

3 A I would presume that it was prepared by the
4 technical relations activity, I believe that is the
5 correct name, that is headed or was headed by
6 Harry Cooke at that time.

7 MR. TRIPOLI: Mr. Lechner, you are only
8 required to answer as to your personal
9 knowledge, if it requires you to speculate
10 or take a guess, just say it would, and we
11 will proceed.

12 Q Was it prepared by RCA, some part of RCA,
13 to your knowledge?

14 A Well, people at RCA Laboratories certainly
15 participated in the preparation of it.

16 Q Do you know why it was prepared?

17 A Yes. It was prepared --

18 MR. ANDERSON: I object, lack of any
19 foundation of this witness's knowledge of
20 management's decisions to prepare this
21 document. If he was involved in that, that
22 decision to prepare it, you ought to establish
23 a foundation for his testifying as to why this
24 was prepared.

25 Q Sir, if you don't know why it was

1 prepared, of course, you will tell me. But if you
2 do know, could you answer the question?

3 THE WITNESS: Can I have Mr. Anderson's
4 comments read back?

5 MR. ANDERSON: Certainly, but I will say
6 to Mr. Tripoli; Mr. Tripoli, I think there is
7 some confusion here. I think the witness is
8 tending to generalize and speculate, and our
9 purpose is to find facts which he was per-
10 sonally involved in. And we have had a very
11 long silence and the witness has now asked to
12 have my statement read back.

13 The purpose of this witness being here
14 is to have him tell us what he personally did,
15 not what he is sure went on somewhere else,
16 even though he is very sure.

17 MR. GOLDENBERG: The purpose of having
18 Mr. Lechner here is to get his testimony as to
19 what he did and his knowledge, and that's all
20 I am seeking, sir.

21 And Mr. Anderson's comments are not
22 comments directed to you, Mr. Lechner, they
23 are directed to me and if Mr. Tripoli feels
24 that a question that I put or Mr. Anderson puts
25 is inappropriate and should not be answered,

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1 he will so instruct you.

2 MR. ANDERSON: I think we all agreed,
3 Mr. Goldenberg, that this witness is only to
4 testify as to what he personally did and of
5 what he has personal knowledge of, not hearsay,
6 not something which someone else told him.

7 MR. GOLDENBERG: I don't think I said
8 anything else.

9 MR. ANDERSON: I wasn't sure.

10 MR. TRIPOLI: May we have a five minute
11 recess?

12 MR. ANDERSON: Sure.

13 MR. THREEDY: Sure.

14 (At which time a short recess was taken.)

15 Q I believe the question you had in front
16 of you, Mr. Lechner, was essentially, do you know
17 the purpose of preparing RCA Deposition Exhibit 1?

18 MR. ANDERSON: I think the question
19 is why it was prepared.

20 Q Do you know why it was prepared, sir?

21 A I can only speculate as to the specific
22 management reasons for its preparation. It was
23 handed out to people who came to the open house.
24 I am fairly certain that I received a copy as I
25 came in the door that day. My wife certainly did

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1 when she came to the open house.

2 I am also quite certain that I wrote the
3 paragraph relating to Location 35, solid state
4 display.

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25 that you have been called to

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Q On what page is that paragraph, sir?

A The pages aren't numbered here.

We have the original document.

Q Oh, yes, sir.

As you look at the exhibit, that refers to Location 35, on Page 2; is that correct?

A It's on the second sheet of the exhibit, yes.

Q I think you have already answered this question in part, but do you know what was done with the original--or the originals of Exhibit 1 at the time of the open house?

A What do you mean by original?

Q What you see there is a copy, sir. The original document did not look quite like that.

MR. ANDERSON: You mean the master that was used to prepare the ones that were handed out?

He has testified they were handed out.

I will stipulate they were handed out. It's in the record in Mr. Cooke's testimony.

MR. GOLDENBERG: Thank you, sir.

That's all you had to do.

MR. ANDERSON: Why don't you ask me.

MR. GOLDENBERG: Why don't you suggest what you might be willing to do instead of

1 prefacing it with that kind of speech.

2 BY MR. GOLDENBERG:

3 Q Do you have any idea of how many people
4 attended the open house?

5 A I don't know a specific number. It was certainly
6 in the thousands.

7 Q How were people invited to the open
8 house?

9 A To my knowledge, a variety of ways were used
10 to invite people to the open house. Some were
11 specifically invited by personal invitation of RCA;
12 others were invited through a ticket distribution
13 means. All employees were given a certain number of
14 tickets which they could use to give to their friends,
15 neighbors, family, et cetera, to come to the open
16 house.

17 Also, local organizations were issued specific
18 invitations to have their members or friends or--
19 I am not familiar with the exact details, but to have
20 additional people come to the open house.

21 Q Now, I believe you testified that the
22 maze game that you described earlier was a
23 demonstration at the open house. Could you by
24 reference to Exhibit 1 state where that game is
25 described in any fashion?

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1 A Yes. It's described on the second sheet of
2 Exhibit 1, in the right-hand column, location 28,
3 "Graphical Display."

4 Q Could you by reference to Exhibit 1 indicate
5 where we might find Location 28?

6 A Yes. Location 28 is on the first floor,
7 near the bottom center of the diagram. Actually,
8 I believe that's Room West 124 at the laboratories.

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1 Q Was that the room in which the equipment
2 used to play the maze game was ordinarily located?

3 A Yes.

4 Q Do you know whether or not any of the
5 visitors to the open house visited Location 28?

6 A Yes, many did.

7 Q Were any of the visitors permitted to
8 play the maze game, do you know?

9 A Yes, many were.

10 Q Was there anyone there at Location 28
11 for any purpose, any employee of RCA, in conjunction
12 with the demonstration?

13 A Yes. As was the case with all of the
14 demonstrations during the open house, there were
15 RCA employees in attendance. And in general, they
16 were the people associated with the particular
17 project and took appropriate turns.

18 Messrs. Miller and Wine, for example, were
19 in attendance at Location 28 at various times during
20 the open house.

21 Q In the description of Location 28,
22 I see a reference to a remote computer. Where was
23 the remote computer?

24 A The remote computer was in downtown Princeton.
25 It was a computer owned by the Applied Logic

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1 Corporation, who was in the business of providing
2 lease time-shared services.

3 Q Do you recall the manufacturer and
4 model number of that computer?

5 A It was a Digital Equipment Corporation
6 computer, and I believe it was a model PDP-6 at
7 that point in time. They subsequently had model PDP-10's.
8 But I'm fairly certain that the one used at that time
9 was a PDP-6.

10 Q Were you yourself personally at Location
11 28 at any time during the open house?

12 A Yes, I was there from time to time during the
13 open house.

14 Q At any time while you were there, did
15 any of the RCA people in attendance provide an
16 explanation to the visitors of what they were seeing?

17 A Yes.

18 Q Do you recall generally the content of
19 that explanation, or to any degree the content of
20 the explanation, if you heard it, sir?

21 A Yes. The explanation was done in conjunction
22 with the demonstration on the display. The computer
23 had been programmed to start with an alpha numeric
24 message on the display, which explained in English
25 text what the display was capable of doing and how it

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1 was connected to a computer and something about
2 the general hardware that was involved there. And
3 what generally was done, when a group of people
4 assembled in the room the person in attendance would
5 ask for their attention and give a command to the
6 computer to start that text message. And then after
7 that message was completed, he would explain what
8 would be shown next, which might be a mathematical
9 graph or a curve, and he would enter some command
10 and the display would proceed to plot that graph or
11 curve, and he would go through two or three examples
12 of things the display and the computer system could
13 do. And then he would finally end with the maze
14 game. And after demonstrating how one played it,
15 he would invite people from the audience in
16 attendance to have a turn at playing it. It was a
17 very popular exhibit, and generally people were
18 waiting in the hall to get in, and he would have to
19 stop people from playing after a certain point so
20 that the next group could have a turn. And other
21 people during that time period would be asking
22 questions informally about what the system did and
23 how it worked, and the people in attendance would
24 explain that.

25 Q At any time you were in attendance,

1 did any of the visitors ask questions?

2 A Oh, yes.

3 Q Were those questions answered?

4 A Yes.

5 Q Do you have any recollection as to
6 whether any of those questions went into technical
7 aspects of what was being shown?

8 A Some of them did, yes.

9 Q Was that kind of question answered, sir?

10 A Within the bounds of not transgressing
11 proprietary information, the questions were answered,
12 yes.

13 Q Was there any other equipment or
14 apparatus of any kind in location 28, other than the
15 equipment necessary to play the maze game?

16 A I'm certain there was, because Location 28
17 is an ordinary laboratory bay where, under normal
18 times, members of our technical staff would be working.
19 There were, undoubtedly, oscilloscopes and volt
20 meters and power supplies and test leads, and things
21 of that sort, in the room during the time of the
22 demonstration.

23 Q Could you tell me whether or not RCA
24 has developed any products which grew out of this
25 activity for which you were responsible in 1967--

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1 that is, the activity involving displays on the
2 face of cathode ray tubes?

3 MR. TRIPOLI: I think it would be
4 appropriate for you to restrict that question
5 to a period of time and not forever.

6 MR. GOLDENBERG: All right, sir. Let
7 me restrict it then to the filing date of the
8 first application of the patented suit,
9 which is in--let me be precise--May 27, 1969.
10 Is that all right, sir?

11 MR. TRIPOLI: Yes.
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1 Q With that limitation.

2 A Up to May 27th, 1969?

3 Q Right.

4 A I need a clarification of the meaning you mean
5 to place on the word "product".

6 Q Well, by that I mean any piece of equip-
7 ment RCA would have brought to the point of
8 development where it was offering it for sale to the
9 public.

10 A And the context of the work that I supervised
11 during that time is all encompassing, of all the
12 things of my group?

13 Q No, sir. I have particular reference
14 to this activity involving the display on the
15 cathode ray storage tube.

16 MR. ANDERSON: On the Tektronix storage
17 tube.

18 Q Well, I want to leave it open, sir, that
19 he may have been in connection with that activity
20 been using equipment in addition to that, but
21 certainly limited to display of data or symbols on
22 cathode ray tubes.

23 MR. ANDERSON: Well, on storage tubes.

24 MR. GOLDENBERG: Storage tubes, if you
25 will.

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1 THE WITNESS: No, we did not bring a
2 product to the point of offering it for sale
3 to the general public in that time period.

4 Q Prior to May of 1969?

5 A That's correct.

6 Q Could you tell me whether or not
7 development effort on that project, and again this
8 is the project of display, cathode ray storage
9 tubes, was that activity abandoned on the part of
10 RCA insofar as you know and the products -- the
11 development with which you were concerned?

12 MR. ANDERSON: Namely, storage tubes.

13 THE WITNESS: In the sense of bringing
14 it to a product that would be offered for
15 sale to the general public, there was a point
16 in time at which the project was terminated in
17 that sense.

18 We have continued --

19 MR. TRIPOLI: I think you answered the
20 question.

21 MR. GOLDENBERG: Mr. Tripoli, I do have
22 a problem here, and I put it to you and I
23 recognize RCA's concerns in the matter. Let
24 me phrase a question that I would like to
25 put, hopefully my final question on this

1 matter, and see if you would not permit the
2 witness to answer it.

3 Has RCA abandoned all interest in the use
4 of cathode ray storage tubes as devices on
5 which various symbols may be displayed and
6 manipulated?

7 MR. TRIPOLI: I would have to object to
8 that question.

9 MR. ANDERSON: I object to that question--
10 excuse me.

11 MR. TRIPOLI: Because this witness is not
12 in a position to speak for RCA. It is a
13 large corporation with a lot of activities.

14 MR. GOLDENBERG: Let me add, to the
15 extent of his knowledge.

16 MR. TRIPOLI: I think we ought to still
17 restrict those questions to at least the time
18 period that you previously suggested, namely
19 May of 1969.

20 MR. GOLDENBERG: All right, sir, I
21 accept that. I will have to live with that
22 problem.

23 MR. ANDERSON: Then you are not going
24 to ask that question?

25 MR. GOLDENBERG: No, I withdraw the

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1 question.

2 Q Mr. Lechner, do you have any familiarity
3 with a pool game played on a cathode ray tube
4 at the time of the open house?

5 A Yes, I do.

6 Q How did you gain what familiarity you
7 have with respect to that matter?

8 A I was a member of the open house planning
9 committee during that time period and in the course
10 of discussions of what things were to be shown
11 at the open house that were conducted by the
12 committee, the pool game, of course, was one of the
13 displays that -- or exhibits that were considered
14 and put on the list of things to be included as a
15 part of the open house.

16 MR. ANDERSON: Before you ask the
17 next question, I think I should clarify the
18 record on the preceding question.

19 I started to object and Mr. Tripoli
20 made a statement. I have no objection to your
21 asking that question that you posed, provided
22 it wasn't the last question, as you said,
23 because if the witness answered in the negative,
24 I would have permitted it to be the last
25 question.

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If he had answered it in the affirmative, I certainly would have wanted him to pursue it at length, and that was the only reason for my objection to your last question.

MR. GOLDENBERG: I was only speaking for myself.

MR. ANDERSON: Well, you were making some sort of commitment to Mr. Tripoli when you spoke.

MR. GOLDENBERG: Whatever commitment I made to Mr. Tripoli was my commitment. You make your own or don't make them as you see fit.

Q Do you recall who suggested the game of pool as part of the open house demonstration?

A The suggestion was probably brought to my attention by Mort Lewin.

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1 Q Do you know who had responsibility for
2 doing the work necessary to prepare the pool game
3 demonstration for the open house?

4 A The supervisor responsible was Morton Lewin.
5 The people who specifically worked on it were
6 members of his research group and they were
7 specifically Mr. Teger, Mr. French and Mr. Larkin.

8 Q Do you know when they began to work on
9 that project?

10 A Sometime in the spring or early summer of 1967.

11 Q Was the project completed in time for
12 the demonstration, the open house?

13 A Yes.

14 Q Was it a part of the demonstration at the
15 open house?

16 A Yes.

17 Q Did you yourself observe that particular
18 pool game demonstration?

19 A Yes, I did.

20 Q At the open house?

21 A Yes.

22 Q Were other people there at the time you
23 were observing it?

24 A Yes.

25 Q Were any of the visitors, that is people

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1 other than RCA employees there at any time that you
2 observed it?

3 A Yes, there were.

4 Q Did you observe it more than once, sir?

5 A Are you confining your question to the period
6 of the open house?

7 Q Presently at the time of the open house.

8 A That four-day period?

9 Q That four-day period, sir.

10 A I am not certain whether I saw it more than
11 once during that four-day period, but I probably did.

12 Q Was there anyone, was there an RCA
13 employee there during the open house providing
14 an explanation such as you described in connection
15 with the one at Location 28?

16 A Yes, there were, as I said earlier in all of
17 the exhibits there were RCA employees present to
18 describe what was being shown and to answer
19 questions.

20 Q Did you hear any explanation provided
21 in connection with the pool game demonstration?

22 A During the time of the open house?

23 Q During the time of the open house, sir.

24 A I am not certain. I may not have been in the
25 room at a point in time when the explanation was

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1 being given. I can't be certain.

2 Q Did you at any time receive an explanation
3 of how the pool game demonstration operated?

4 A Yes.

5 Q From whom did you receive that explanation?

6 A It would have been either or both, or all,
7 Mr. Teger, Mr. French and Dr. Lewin.

8 Q In providing you with that explanation
9 did they also explain to you or describe to you the
10 apparatus involved?

11 A They probably did not describe the apparatus
12 specifically at the time they gave that explanation
13 to me because I already had a general familiarity
14 with the apparatus and it would not have been
15 necessary for them to repeat that specific aspect
16 of it.

17 Q Do you have any recollection at the time
18 they provided whatever explanation or description
19 they gave you that you had an understanding of how
20 that apparatus and demonstration worked?

21 A Oh, I certainly had an understanding of how
22 the apparatus and demonstration worked, yes.

23 Q Did you come to any view, I am talking
24 now on or about the time of the demonstration,
25 as to whether or not the objectives that Dr. Lewin

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-4¹ and his people had were achieved with respect to
2 the pool game demonstration?

3 MR. ANDERSON: I object to the question.

4 It lacks a foundation, it is irrelevant and
5 it is speculative. There is no foundation
6 that this witness had knowledge of all of
7 the objectives of Mr. Lewin and, certainly,
8 therefore, cannot say whether those unknown
9 objectives of Mr. Lewin were accomplished or
10 not.

11 I suggest you call Mr. Lewin if you
12 want ~~that~~ information.

13 Q Do you know what the objectives were
14 in preparing the pool game demonstration?

15 MR. ANDERSON: I object for lack of
16 a foundation. Whose objectives?

17 MR. GOLDENBERG: Well, the witness has
18 testified he was on the committee responsible
19 in part for arranging demonstrations, and I
20 don't know that there is anyone better we
21 could call to inquire as to what the objective
22 of any particular part of the demonstration
23 was.

24 MR. ANDERSON: I think you have asked
25 that question of another witness and it's

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1 been answered.

2 MR. GOLDENBERG: Well, I am asking it
3 of this witness. I understand that, sir.

4 MR. ANDERSON: I object also on the
5 ground that it is not the best evidence unless
6 you establish that this witness had full
7 knowledge or it was his objective that you
8 are inquiring about.

9 MR. GOLDENBERG: Well, I have already
10 stated my position. I truly do not understand
11 the best evidence objection, which I don't
12 believe has anything to do with what we are
13 concerned with, sir.

14 If you have not forgotten my question,
15 Mr. Lechner, could you answer it?

16 THE WITNESS: The objective was to,
17 with respect to the open house, find a way
18 to demonstrate interactive computer graphics
19 in a way that would have meaning to the layman.
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1 Q Based on your knowledge of the pool game,
2 as you saw it and it was explained to you, did you
3 form any view at the open house or prior to the
4 open house as to whether that objective had been
5 achieved?

6 A Yes, I think the fact that the exhibit was
7 a very popular one and was commented on frequently
8 by people who had attended the open house, made
9 me feel that the objective of creating something
10 that had popular appeal to the laymen had been
11 achieved.

12 Q Do you know whether or not people were
13 able to play a game on that apparatus approximating
14 or resembling a real game of pool?

15 A They were able to play the game --

16 MR. ANDERSON: I object, you are leading
17 the witness, clearly.

18 MR. GOLDENBERG: I don't think so. I
19 don't think so.

20 Could you answer the question, sir?

21 THE WITNESS: They were able to play a
22 game that simulated a game of pool in the sense
23 that using the light pen was equivalent to
24 using the cue stick and that seeing the balls
25 move on the screen was equivalent to seeing

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1 them move on a real table. And in that sense
2 they were able to play a game of pool. The
3 details of scoring and so forth were different
4 from the usual scoring arrangement in the
5 pool games as I know them. I am not familiar
6 with all the ways in which pool can be
7 played, but the scoring was not quite the usual
8 scoring. But it simulated the playing of a
9 game of pool.

10 Q Could you state your understanding of the
11 apparatus you used to demonstrate the pool game and
12 how it worked?

13 A Well, the apparatus consisted of several
14 components.

15 There was a computer which was an RCA model
16 70/25 with the usual kinds of computer peripherals,
17 card and tape equipment and high speed communication
18 interface to a larger computer.

19 There was also a special direct memory access
20 interface. That is a piece of hardware that was
21 designed and constructed by Dr. Lewin to interface
22 the computer to the display unit.

23 The display unit was a commercial item
24 manufactured by Information Displays, Incorporated,
25 IDI, which was purchased from them. It consisted

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1 of the cathode ray tube itself and the necessary
2 digital and analog hardware to interpret commands
3 from the computer and generate deflection and
4 intensity modulating wave forms for the cathode ray
5 forms to produce the image on the screen. There is
6 also a light pen associated with the display and,
7 of course, there was a keyboard to allow
8 communication to the computer.
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Q Thank you, sir.

I would like to return to the maze game for one further question. As I understood your description of the maze game that as the player moved across the face of the tube, if he bumped into a wall he would be stopped; is that correct?

A That is correct. There were several different ways in which the game proceeded from that point which were either selectable options when one started the game or they were changes that the people programming the game made from time to time during its evolution. The most usual next step, as I recall it, was that he would be put back to the beginning. The wall that he hit would be momentarily drawn in to show him that he had hit a wall, and then he would be put back to the beginning. And so it behooved him to remember the steps he had taken thus far without having hit any walls before he could continue and remember that in one of the four directions he would try to go at that point-- actually, one of three directions, because the fourth direction would be retracing one's steps, he would hit a wall. So his options had been reduced from three to two, if he could remember all the steps. That was the challenge mentally to get

Lechner - direct

1 through the maze.

2 Q Could you describe what the observer would
3 see upon the circumstance of hitting a wall and
4 being put back to the beginning? What would he
5 see taking place on the face of the tube?

6 A What he would see taking place is just prior
7 to having taken that step there would be the
8 rectangle that outlined the maze, there would be
9 the corner markings, the beginning point and end
10 point, which I believe or maybe a small X and a
11 small zero, or maybe they were both small x's.
12 He would see the path he had followed thus far
13 traced out, go up one step or up two steps, and
14 so on, to whatever point he was at. He would then
15 see the short line segment that he had attempted to
16 draw in the direction he had chosen to go. When he
17 pushed the key to make that choice, that segment
18 would be drawn. Then the piece of wall that he
19 had hit would be drawn. There would be a momentary
20 pause, and then a green flash on the screen which
21 was due to the erasing of the screen, because the
22 computer at that point issued an erase command to
23 the display. That completely erased the screen.
24 And then the outline would be redrawn, and the
25 starting and end points would be redrawn, and

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1 he could commence again to try to work his way
2 through the maze.

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Lechner - direct

Q Could you describe briefly the apparatus or mechanism or method by which the game detected when a player had hit a wall?

A Yes. The maze itself was stored in the memory of the computer, being in the form of a mathematical description. And so the computer knew, if you will, where all of the walls were for the particular maze that was challenging the player at that point. And so the computer also, of course, kept track of the steps he had taken thus far. And when he took that next step, the computer checked against its prior list of the knowledge of the physical description of the maze to see whether he had chosen a direction that would take him into a wall. And if so, he took the action that I previously described. If not, he drew the line segment that he had chosen previously and then he would continue from there.

Q In what you have just described, was it a determination that the player had actually hit the wall, or was it a determination that he was moving in a direction where he would hit a wall?

A It was a determination that he was moving in a direction where he would hit a wall.

MR. GOLDENBERG: I think we are just about

Lechner - direct

1 done.

2 May we just have a minute?

3 MR. TRIPOLI: Sure.

4 (A short recess was taken.)

5 MR. GOLDENBERG: Very few more questions,

6 I trust.

7 BY MR. GOLDENBERG:

8 Q Mr. Lechner, did you receive tickets
9 for the open house?

10 A Yes, I did.

11 Q What did you do with your tickets, sir?

12 A I distributed them to some members of my
13 immediate family, my wife, my parents, and also to
14 some friends and neighbors.

15 Q How many tickets did you receive?

16 A I don't recall the exact number.

17 Q Were there any restrictions put on you as
18 to whom you could distribute tickets?

19 A Not that I recall, no.

20 Q Were any of your friends and neighbors
21 employed by any other companies, that you know?

22 A Yes.

23 Q Were any of them employed by any other
24 companies engaged in any aspect of the electronics
25 business, if you know, sir?

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Lechner - direct

1 A I just have to think.

2 Q I understand.

3 A I don't believe any of the people to whom I gave
4 tickets were employed by companies in the electronics
5 business.

6 Q Do you have any knowledge of any motion
7 picture, or motion pictures made of the pool game
8 demonstrated at the open house?

9 A Yes.

10 Q Could you state what that knowledge is?

11 A There was a motion picture made by the BBC
12 at some time after the open house; I don't know the
13 exact time.

14 I'm also reasonably certain that CBS News
15 made a film of the pool game prior to the open
16 house. It would have been earlier that week.

17 Earl Ubell, their reporter, and a film crew
18 came to the laboratories sometime earlier that week
19 and filmed a number of exhibits. In particular,
20 they filmed the solid state display, shown at
21 Location 35, and I was present personally at that
22 filming; and a portion of that film was shown on
23 CBS news. They filmed a number of other things,
24 and I'm fairly certain that the pool game was
25

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1 included; but I was not present, I don't believe,
2 when they filmed it.

3 Their records, of course, would show what they
4 filmed and whether they have the film, and, so on.

5 Q Have you ever seen the BBC film?

6 A Yes, I have.

7 Q When did you first see that, sir?

8 A I don't know the specific date. It was some
9 years ago.

10 Q Do you think it was before 1970?

11 A I'm quite certain it would have been before
12 1970, yes.

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1 Q Do you recall the occasion on which you
2 first saw it? What were the circumstances?

3 A I don't have a specific recollection of
4 circumstances.

5 Q When was the most recent occasion which
6 you saw the film?

7 A Last Friday.

8 Q Could you describe the circumstances
9 under which you saw it then?

10 A Yes. You and Mr. Williams, Mr. Tripoli, and
11 Fred Teger and Harry Cooke and I, and Mr. Roy
12 Christensen, who ran the projector--Russ and John
13 left--and perhaps one or two other people were
14 present in the room, East 101, at RCA Laboratories
15 shortly after lunchtime, when the film was run.

16 Q From your recollection of the film
17 on any occasion that you have seen it, be it the
18 first time or the occasion on last Friday, and your
19 recollection of the pool game demonstration at the
20 open house in 1967, do you believe the film to be
21 an accurate depiction of the pool game demonstration
22 as it was at the time of the open house?

23 A Yes, sir.

24 MR. ANDERSON: I object to the question
25 as irrelevant, hearsay, asking for opinions,

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1 and not the best evidence.

2 MR. GOLDENBERG: The best evidence, of
3 course, is the film itself. But due to a
4 set of circumstances beyond any of our control,
5 it is not here today. So I think I'm entitled
6 to inquire into the witness's knowledge
7 according to his best recollection.

8 MR. ANDERSON: Well, you and I may
9 disagree whether the film is the best
10 evidence; but at least we agree that this
11 testimony is not.

12 BY MR. GOLDENBERG:

13 Q I believe you answered the question;
14 did you not, sir?

15 A Yes.

16 Q In the pool game, as you recall it
17 being played in the fall of 1967, what would happen
18 when the cue ball hit one of the other pool balls?

19 A The cue ball would rebound and the other ball
20 would be set in motion on the screen.

21 Q What would happen when any one of the
22 balls hit the side of the pool table?

23 A It would rebound from the side of the pool
24 table.

25 Q Were there pockets in the display of

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1 the pool table?

2 A Yes. There were the normal six pockets: the
3 four corners and the centers of the two long sides.

4 Q What would happen when any one of the
5 balls would enter a pocket?

6 A It would disappear from the screen.

7 Q Do you have any knowledge of any newspaper
8 reports with respect to the open house in the fall of
9 1967?

10 MR. ANDERSON: You're referring to
11 present knowledge today?

12 MR. GOLDENBERG: Present knowledge today.

13 I thank you, Mr. Anderson.

14 MR. ANDERSON: Of something that
15 exists today that purports to be something--

16 BY MR. GOLDENBERG:

17 Q Do you understand my question, sir?
18 It's possible you don't after Mr. Anderson has
19 contributed.

20 A Could I have it read back?

21 MR. GOLDENBERG: Yes.

22 [The Reporter reads the pending question.]

23 MR. ANDERSON: I object to the question
24 as hearsay, irrelevant. Mr. Tripoli has
25 produced some documents. If you're asking

1 this witness whether he has seen documents
2 produced by Mr. Tripoli, that's one thing.
3 If you're asking him about knowledge that he
4 had in 1967, that's a different question.
5 I'm not sure which one you're asking. Until

6 I do, I object on the ground that it's
7 vague and ambiguous.

8 MR. GOLDENBERG: I don't believe it is,
9 sir.

10 BY MR. GOLDENBERG:

11 Q Do you find the question vague?

12 If you do, tell me where you are troubled by it and
13 I will attempt to explain it.

14 A I will attempt to answer the question.

15 Q All right, sir. Thank you.

16 A I know that members of the press were in
17 attendance at various times prior to and during the
18 open house. I specifically remember the CBS news
19 people being there, as I testified earlier. I would
20 presume that they had written some reports which were
21 probably published, but I have no specific recollection
22 of reading any of those reports at that time.

23 Q Do you have any recollection of reading
24 any such reports at any subsequent time?

25 MR. ANDERSON: I object to the question

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as irrelevant, clearly hearsay.

A No, I do not.

MR. GOLDENBERG: We have no further questions.

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-1 CROSS-EXAMINATION
2 BY MR. ANDERSON:

3 Q Mr. Lechner, you have made certain
4 references to Location 35. It's one of the
5 locations listed on the second page of RCA Exhibit
6 1.

7 Was Location 35 a demonstration of
8 that 1200 element fail-electric display that you
9 testified that you worked on earlier in your
10 testimony?

11 A Yes, it was.

12 Q That was the one that was a 30 x 40
13 element matrix, where each element could be
14 illuminated to generate a display of some sort?

15 A That's correct.

16 Q I notice that that location 35 display
17 is under the category in Exhibit 1, "Audio and
18 television." Was that a part of television work that
19 was being done at the laboratory at that time?

20 A Yes and no. Let me try to clarify that.

21 The work was done under my direction in a group
22 that was a part of our computer research activity.
23 But the display itself had the capability of
24 reproducing a rudimentary television image limited
25 to 1200 elements of resolution. And so it had

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1 relationship to television.

2 If one were to extrapolate that work to a
3 larger number of elements, it could have been used
4 equivalently to a cathode ray tube in reproducing
5 television images. And so one could classify it
6 as computer-related or television-related, or
7 both, since digital techniques were used in control-
8 ling and addressing it. But in the end, it
9 produced a television-like image.

10 Q Right, I understand.

11 Were the groups that you were in working
12 both on the computer research and the development
13 and on television research and development?

14 A The group was chartered to work on computer
15 related projects. However, one frequently has
16 difficulty in making a clear distinction between
17 different fields when classifying a particular
18 project and its objectives.

19 This display clearly could be applied to
20 television application or to computer terminal and
21 peripheral applications. And we certainly, those
22 of us who were directly in that work and
23 participated in it, had both potential and applica-
24 tions in mind.

25 Q

to the solid state

1 1200 element display, I think you testified that
2 your work took digital data and converted it into
3 X, Y and Z data to activate the display; is that
4 correct?

5 A Not exactly. The display is digital in
6 nature because it has discreet elements, as opposed
7 to the analog nature of the cathode ray beam,
8 which is scanned by a signal that is analog in
9 nature in general. However, the information source
10 that we used, namely a television camera, was
11 analog in nature.

12 The signals that were taken from the camera
13 were processed and delivered to the display in a
14 fashion that was both analog and digital.

15 The positional aspects of the information were
16 digitized and addressed specifically to 30 and 40
17 elements of the rows and columns respectively.

18 But the brightness information was transferred
19 in analog fashion.

20 Q Now, to relate what you have just said to
21 your prior testimony, which I think was X, Y and
22 Z, then if I understand it, the processing in the
23 digital equipment that you created produced an
24 X address between one and 40, I presume, and a Y
25 address between one and 30 to locate the particular

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1 spot that you wanted to illuminate; and then it
2 generated Z information, which was intensity to tell
3 the equipment how bright that specific point should
4 be. Is that essentially correct?

5 A That's correct, except that the Z information
6 was not separately transmitted to the panel.
7 The brightness information was contained in the
8 amplitude of the Y -- I'm sorry -- the X pulse that
9 was delivered to the column of the display. So that
10 only two signals actually were used to address
11 that point, the X and the Y signals; the brightness
12 information being contained in the X signal.

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Q I understand. Now, on the electronics storage tube, when you displayed your maze demonstration, it is my understanding that there was a continuous line generated that showed the path that the operator selected along or across the screen, is that correct?

A Not exactly. The line was not really a continuous line. The line was made up of a series of individual dots. The overall screen was divided into a rectangular, actually square array of 512 by 512 positions. And the electronic hardware that drove the Tektronix scope could either put a dot down or not put a dot down at any particular position the beam was at. Or it could move the beam in any one of eight directions to the nearest -- to the nearest dot, nearest next position and then put a dot there or not.

Q And did the operator build this series of dots that looks like a line one dot at a time or a group of dots at a time?

A The command structure that came from the computer told the hardware to make a line of either one dot lengths, two dot lengths, four dot lengths, et cetera, binary progression.

Q So the next one would be eight and

1 sixteen?

2 A Eight and sixteen and so on. In one of those
3 eight major compass point directions. The hardware
4 would then interpret that command to step the beam
5 through the appropriate number of steps, one, two,
6 four, eight, et cetera, and one of the eight
7 directions and illuminate each dot at each step.
8 So that the appearance to the observer was the
9 creation of a line segment, but it actually was
10 comprised of a sequence of dots.

11 Q Did the operator who was generating
12 the demonstration decide whether a given step would
13 be made up of one dot, two dots or 16 dots, or was
14 that preset?

15 A In the case of the maze game, the programmer
16 who wrote the computer program decided in advance
17 how many separate positions there would be in the
18 maze and what the length of the line segment would
19 be, and when the player of the game pushed the
20 key saying he wanted to move to the right, for
21 example, the program would generate the command
22 to the hardware to generate a line segment of a
23 certain length in that direction to the right, and
24 the hardware would interpret that producing that
25 line segment as a sequence of dots in that direction.

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1 Q And with respect to the program that was
2 used for the demonstration at the open house, what
3 number of dots were applied each time the button was
4 pressed?

5 A I don't remember the specific number.

6 Q Was it more than one?

7 A It was more than one.

8 Q So each time the button was pressed at
9 the demonstration it appeared that a line segment
10 was immediately generated on the screen?

11 A That's correct.

12 Q And as that was being done in the
13 demonstration, as I understand it, there were no
14 walls or barriers visible on the screen, but they
15 were all invisible and the operator didn't know
16 whether he was going to hit one or not when he made
17 a selection, is that correct?

18 A In the usual mode that is correct. There were
19 different modes in which the game could be operated
20 and at various times during the open house the
21 different modes were used.

22 I described earlier in some detail the usual
23 procedure where no walls were visible, and if one
24 moved in a direction that would make him hit a wall,
25 the wall was momentarily drawn and then he

1 was put back to the beginning.

2 Another mode in which the game was played was
3 the following:

4 When he would hit such a wall, the wall would
5 remain and he would not be put back to the beginning
6 but he would lose a point and he could continue from
7 that point on. So a partial maze would be constructed
8 for him every time he hit a wall; that wall would be
9 drawn and left there. So there were several modes
10 in which it could be operated.

11 Q In the usual mode at the time of the
12 selection of the line segment that would have
13 intersected the wall, did you see a cross where the
14 line of the operator intersected the line of the
15 wall and then get this green flash that you referred
16 to when the screen was erased and you got a start over?

17 A I don't specifically recall what was drawn
18 on the screen when the operator made such a choice
19 that would take him into a wall. I know, my recollection
20 is certain that the wall was drawn momentarily and then
21 the erase splash occurred. But exactly how the fact
22 that he had hit the wall with the line segment was
23 shown to him, I do not recall today.

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1 Q With respect to the Tektronix storage
2 oscilloscope that you were using in this work, as
3 I understand it, it was an oscilloscope that had
4 the ability to display a point or a line and that
5 would continue to appear without refreshing for a
6 long period of time, is that correct?

7 A For a period of time, that is correct.

8 Q What was that?

9 A Not indefinitely.

10 Q What was that period of time, do you
11 know?

12 A Minutes, certainly. There would be a gradual
13 deterioration of the quality of the image with
14 time. And one has to decide when he considers
15 it no longer acceptable. But it is minutes.

16 Q But once the point was put on the
17 visible screen, it would stay there for a period of
18 minutes?

19 A That is correct.

20 Q So as you displayed this line in that
21 demonstration, unless you erased the whole thing
22 with this green flash, you continued to see every-
23 thing that had been put into it by the operator
24 for the last several minutes?

25 A The usual mode was to operate precisely

Lechner - cross

1 as you describe; that is to, unless you erase the
2 entire screen, you would see everything that had
3 been drawn since the last full screen erasure.

4 However, it was possible to operate in a mode where
5 you could display information on the screen but not
6 have it be stored, in which case you would have to
7 refresh it if you wanted to maintain its
8 viewability.

9 Q Now, I believe you testified that out of
10 this work with the Tektronix storage oscilloscope,
11 up until 1969, no sold product or products offered
12 for sale by RCA was generated, is that right?

13 A That's correct, there were no products
14 offered for sale.

15 Q Now, isn't it a fact that even after
16 1969 that that same fact is true, no product was
17 offered for sale that grew out of this Tektronix
18 static display work?

19 MR. TRIPOLI: I will advise the witness
20 that he doesn't have to answer that question.

21 MR. ANDERSON: I think you permitted
22 him to answer as to 1969, and I think we are
23 entitled to know.

24 MR. THREEEDY: He restricted the question
25 up to 1969.

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1 MR. ANDERSON: I understood that.

2 MR. THREEDY: We were not permitted to go
3 beyond 1969, Mr. Anderson. I don't think on
4 cross-examination you have any greater right to
5 go beyond 1969.

6 MR. TRIPOLI: I specifically restricted
7 the question to the 1969 period because the
8 subpoenas were framed to 1969.

9 MR. ANDERSON: Not the subpoena Mr.
10 Goldenberg is acting on, only our subpoena
11 as to documents.

12 MR. GOLDENBERG: I think Mr. Tripoli
13 restricted it and I think both sides should
14 respect that.

15 MR. ANDERSON: I will put some other date
16 limit on it, but I would like to go beyond
17 1969.

18 MR. Tripoli, can the witness answer the
19 question concerning the period up until, say,
20 1972? That is certainly not current work.

21 MR. TRIPOLI: In fairness to both sides
22 and because I don't know the answer to your
23 question, I would restrict the answer to
24 1969.

25 MR. ANDERSON: We are only asking, Mr.

1 Tripoli, about products that have been sold by
2 RCA, on the market.

3 Now, that certainly is not confidential
4 information. I will ask again the question up
5 through the end of 1962 with respect to RCA
6 products that were offered to the public for
7 sale, and it is restricted to that.

8 MR. TRIPOLI: You can answer that
9 question if you know the answer to it.

10 THE WITNESS: And the specific, the question
11 refers specifically to products based on a
12 storage tube display?

13 MR. ANDERSON: That's correct.

14 THE WITNESS: Can we have a momentary
15 conference?

16 (Discussion off the record.)

17 MR. ANDERSON: Back on the record.

18 Mr. Goldenberg, while you were out of the
19 room, and Mr. Threedy was here, we had a
20 brief discussion about the pending question and
21 I indicated I was only interested in responding
22 to the last question with respect to storage
23 displays that were offered for sale by
24 RCA prior to the end of 1972 which included
25 some sort of operator interaction because if

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1 there is something internal that just used for
2 pure storage, or that type of thing, I am not
3 interested in.

4 And if it is all right, then I will
5 restrict the question and if Mr. Tripoli will
6 permit the witness to answer, I would like the
7 answer to that question.

8 MR. GOLDENBERG: If Mr. Tripoli has
9 consented, I will not say anything now. We will
10 see on redirect if I have a problem there.
11 I don't want to complicate your life anymore
12 than I actually must.

13 MR. TRIPOLI: I would instruct the
14 witness he can answer if he knows the answer
15 to the question.
16
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1 THE WITNESS: Prior to the end of 1972,
2 to the best of my knowledge, RCA did not
3 offer for sale any commercial product to the
4 general public based on the use of a direct
5 view storage tube with operator interaction
6 such as the display system that was shown
7 at the open house during 1967.

8 Q Thank you.

9 Now, you testified, I think, that today
10 you have between 20 and 25 technical people
11 reporting to you and approximately the same number
12 of support people, is that correct?

13 A That's correct.

14 Q In 1967, perhaps in the early part of
15 1967 before your responsibilities changed, how many
16 people reported to you, if any?

17 A Approximately five or six members of the
18 technical staff and approximately four or five
19 supporting--three to five supporting technical
20 people.

21 Q With respect to your duties and
22 responsibilities in the latter half of 1967 after
23 you had a change of duties, did that number change?

24 A Yes, it did.

25 Q How many did you have then?

-21 A It increased to eight or nine, to the best of
2 my recollection, members of the technical staff,
3 and five to seven supporting technical people.

4 Q I think you said you were in a section
5 in early 1967 that reported to Dr. Ian Rajchman,
6 is that correct?

7 A That's correct.

8 Q Was that section 10?

9 A Yes, that was what was known as section 10.

10 Q I see. And later in the year you said
11 you reported to Mr. Webster, is that correct?

12 A Dr. Webster, yes.

13 Q Dr. Webster. Excuse me.

14 And was that section 11 when you
15 reported to Dr. Webster?

16 A Yes.

17 Q You used the term several times "inter-
18 active graphics," and I think at one point you said
19 what you meant by that. My notes indicate you said
20 interactive graphics equals a system where the
21 operator could manipulate something and see the
22 result on some display. Is that a fair definition?
23 If it is not the one you gave, is it fair?

24 A Maybe I should clarify it to be precise so
25 that the wording is not ambiguous.

1 Q Fine. Excellent.

2 A To me interactive graphics means a situation
3 where a human being makes commands to an electronic
4 system by pushing keys, using light pens, using joy
5 sticks, mouses, et cetera, which indicate to the
6 computer system that he wishes a change to be made
7 in a graphical entity; a description of which is
8 stored within that computer. And the human being
9 receives feedback as to the action the computer has
10 taken by a visual presentation on the screen of a
11 cathode ray tube or other visual display device
12 such as a matrix XY address display.

13 And this iterative interactive process
14 continues and typical applications are the
15 creation or the modification of engineering drawings
16 applicable to printed circuit boards or masks for
17 integrated circuits or architectural drawings, et
18 cetera.

19 Q Mr. Lechner, did you own a television
20 receiver in 1967?

21 A Yes, I did.

22 Q When did you acquire your first
23 television receiver?

24 A I acquired my first television receiver--it is
25 a question of what is meant by my.

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Our family acquired its first television receiver in 1947 or '8. It was a transvision kit which I built in high school.

Q And I understand you continued after that to do television receiver maintenance through about '53, I think, according to your direct testimony?

A Yes, I worked on and off between 1947 or '48 and the time I entered the Army in early 1953 repairing television sets; first while I was still in high school on a part-time basis for friends in the neighborhood and so on, and then subsequently during 1950, '51 and '52 part time at times when I was going to school for friends and neighbors, and full time for two television firms located in New York City.

Q Have you continued to do your television receiver maintenance since that time?

A I still fix my own, yes.

1 Q I think you said that in the Spectra
2 70/25 that was used to demonstrate the equipment at
3 the open house with a pool demonstration, the
4 Spectra 70/25 was interfaced with a larger computer,
5 is that correct?

6 A That's correct.

7 Q What was the larger computer?

8 A The larger computer at that time I believe
9 was a Spectra 70/45 or of that family.

10 Q Now, from testimony yesterday we were
11 told that the Spectra 70/25 had a price from RCA
12 in the neighborhood of \$90,000. Does that conform
13 to your understanding?

14 A I don't remember the specific prices of our
15 computer products at that time, but -- I don't
16 remember what they specifically were.

17 Q Now, with respect to the larger computer,
18 the 70/45, what was the approximate price of that
19 computer?

20 A Again, I have no idea of the specific price.

21 Q Well, in some meaningful parameter
22 can you relate it to the size of the 70/25? Was it
23 twice as big or five times as big?

24 A It was a larger computer and it had a larger
25 complement of peripherals associated with it and,

1 therefore, its cost would have been greater than the
2 cost of the 70/25 and its peripherals.

3 Q Do you have any idea of whether that would
4 be in the order of twice as much or five times as
5 much or ten times as much.

6 A I would think it would be at least twice as
7 much, but I have no specific knowledge of those prices
8 at that time.

9 Q Now, was that interface between the 70/25
10 and the 70/45 used at all in the pool demonstration,
11 if you know?

12 A No, it was not used in the pool demonstration.
13 It was used to permit those two computers to
14 communicate with each other when that was a desirable
15 thing to do for the transfer of programs and for
16 other uses which the 70/25 was intended to fill.
17 It is possible that the pool game program was at
18 one point moved between those computers over that
19 communication link, but I am not certain of that and
20 have no specific knowledge of it.

21 Q With respect to the work which you were
22 doing for RCA, both prior to your change of duties
23 in mid 1967 sometime and after your change of duties
24 in mid 1967, were all those activities at the
25 David Sarnoff Center in Princeton or did they take

1 you elsewhere?

2 A The work that I was doing and the people that
3 reported directly to me was all done at the David
4 Sarnoff Research Center, but we had periodic contacts
5 with people in the divisions of RCA, various divisions
6 of RCA with whom we were cooperating in some fashion
7 or other, either they were able to supply us with
8 knowledge that would be helpful in our work or they
9 were the potential product activities within RCA
10 that would use the results of our research and
11 development in Princeton.

12 Q Now, you have testified with respect to
13 work on interactive graphics at RCA in 1967 that
14 (1) you were working on this system using the
15 Tektronix storage display and (2) there was work
16 being done with the IDI equipment.

17 Was there any other active program going
18 on at the RCA David Sarnoff Center in 1967 with
19 respect to an interactive graphic system that you
20 know of?

21 A Certainly the work we were doing on the faro
22 electric matrix display could have been applied to
23 interactive graphics. We never specifically
24 demonstrated that on that display, but it was always
25 in the back of our minds that that was one of the

1 impossible applications of that display. If one
2 considers a hard copy device a display and the broad
3 use of the word display generally does include a
4 hard copy device, we were working on some hard
5 copy devices that were capable of producing line
6 drawings and simple graphic entities and that were
7 interactive on time-shared computers.

8 Q Any others that you can recall right now?

9 A No others that I can recall right now.

10 MR. ANDERSON: No further cross-examination.

11 REDIRECT EXAMINATION
12 BY MR. GOLDENBERG:

13 Q Mr. Lechner, I show you a photograph which
14 has been identified as RCA Deposition Exhibit 12 and
15 I ask you, looking at that photograph, can you tell me
16 if all of those things which I will characterize as
17 cabinets in the background of the drawing, there seem
18 to be two rows of them, were part of the 70/25
19 computer, or were some of them part of some other
20 piece of apparatus as well?

21 A They were all a part of what we called the
22 70/25 computer system. But the 70/25 computer itself
23 occupied only a portion of all of those cabinets.

24 A computer is a system that has many components.
25 It has the main central processing unit, the memory,

1 the input, output controllers and controllers
2 associated with peripherals, which should the
3 controllers for the peripheral -- the peripheral
4 equipment including the card punch and the
5 magnetic tapes and so forth. All of those things
6 were housed in these cabinets and some of the
7 cabinets also contained the communications interface
8 which I mentioned earlier that was able to talk to the
9 larger 70/45 computer.

10 Also, somewhere in one of those cabinets was
11 that special direct memory access interface that
12 enabled the computer and the display to communicate
13 with each other.

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1 Q You made reference to a 512 dot matrix
2 in response to a question by Mr. Anderson, sir.
3 Could you describe what this matrix was on the face
4 of the tube, I gather? Is it a series of dots
5 and rows and columns, or locations?

6 A Right. What was done in the case of the
7 storage tube display system was for the purpose
8 of creating a graphical entity, including alpha
9 numeric characters, which were also treated as
10 graphic entities.

11 The screen was divided up into a matrix of
12 512 x 512 positions, approximately a quarter of a
13 million individual dot positions, which were
14 arranged in 512 columns of 512 elements each,
15 side by side, equal spacing between them. When the
16 computer sent an instruction to the display to
17 draw a graphical entity, if it was commencing to
18 draw something from a blank screen, the display
19 hardware would position the beam at the lower
20 left-hand corner of the screen, and the computer
21 could then send instructions to the display hardware
22 to move the beam a specific number of dots to the
23 right or to the left or up or down, or in a 45
24 degree direction, the eight major compass points
25 in all from the present position. And the

1 starting point was always the lower left-hand
2 corner. But once you had made one such movement,
3 you could then make subsequent movements from that
4 last point, and so the display was always built
5 up on the screen in that fashion.

6 When the beam actually moved, it moved in small
7 incremental steps along that 512 x 512 grid. The
8 beam was either instructed to remain off, that is,
9 to not write on the screen when it made those
10 motions, or to at each of those individual steps
11 when it pauses before taking the next step turn
12 itself on and make a dot at that point.

13 As I explained earlier, the instructions always
14 called for the beam to move either one position or
15 two positions or four or eight or sixteen, in
16 binary progress, so that one could efficiently make
17 the line segment of any desired length by calling
18 for the appropriate number of steps in sequence.

19 For example, if one wanted to make a 15 unit
20 long line, one would call for a step of eight, a
21 step of four, a step of two, and a step of one;
22 and that adds up to fifteen.

23 The individual spots were generally not
24 visible as individual spots, because the resolution
25 capability of the display was approximately equal to

1 the 512 x 512 pattern. And so without careful
2 examination, the eye did not perceive the individual
3 dots, but perceived a continuous line.
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1 Q Thank you, sir.

2 With reference to the maze game, you
3 indicate there were several modes. Was there a mode
4 where the maze was displayed at all times during the
5 playing of the game?

6 A Yes. I believe there was what we would have
7 called the very simple mode, where the entire maze
8 would appear, and all that the operator had to do,
9 or the game player had to do was not make a mistake
10 in choosing his directions as he worked his way
11 through it. We sometimes initially demonstrated it
12 that way so that people could gain an understanding
13 of what they were trying to do by showing them the
14 whole maze is working your way through and saying
15 now you have to do it without being able to see the
16 walls.

17 Q How was that done, if I understand what
18 you have said, that the storage tube had a capability
19 of displaying whatever was written on there, say,
20 for a matter of minutes, and perhaps it might take
21 somewhat longer than that to play a game when you are
22 playing it in I think what you have called this simple
23 mode?

24 A No. Generally, it would take a person a matter
25 of only a couple of minutes to play the game, and

1 the display would not begin to visibly deteriorate
2 during that time. It took several minutes before one
3 noticed any visible deterioration. And in fact, one
4 could still make out the maze perhaps after ten or
5 fifteen minutes, although one would begin to see the
6 lines fading and broadening and the background coming
7 slowly up after 10 or 15 minutes. And the normal
8 total playing time for a game is only a minute or two.

9 Q Was there any capability in any of this
10 apparatus to refresh the display so as to maintain
11 it for a longer period of time than the normal
12 storage period?

13 A Yes. If one had called for a specific graphic
14 entity to be put on the screen, let's say a plot
15 of a mathematical curve, and after several minutes
16 one decided that it was no longer clear enough
17 because of the fading that occurred in that kind of
18 display, one could simply ask the computer to erase
19 the screen and redraw that entity, because the
20 computer had a stored list of the descriptions of
21 that entity and could do so.

22 Q I believe it is your testimony that up to
23 the end of 1952 there was no product offered for
24 sale--I'm sorry, '72, I misspoke--that there was no
25 product offered for sale by RCA which was related to

31 this direct viewing interactive display using the
2 storage tube. Could you tell me whether or not up to
3 that time period there was any product offered for
4 sale by RCA which used any kind of cathode ray tube
5 display in which there was interaction between a user
6 and the machine? And I don't want to limit the
7 question, limit the inquiry to storage tubes, but
8 cathode tube displays generally.

9 MR. TRIPOLI: You can answer the question
10 for the period up to 1972, if you know the
11 answer.

12 MR. GOLDENBERG: If you know, sir.

13 MR. TRIPOLI: I would like you not to
14 speculate or guess.

15 A Yes.

16 Q Could you state what that device is,
17 sir?

18 A There is specific device that I recollect,
19 and that is the RCA 70/752 video display terminal,
20 which was offered for sale and/or rental by RCA.

21 Q Could you describe generally the
22 capabilities of that device and how it was used
23 or how it would be used in a typical application?

24 A Yes. The device consisted of a typewriter-
25 like keyboard, a cathode ray tube, black-and-white

1 cathode ray tube, and associated electronics, and
2 an interface to a digital communications facility,
3 which could be a telephone line or other inter-
4 connecting cable to another such display unit or
5 through a computer. The general capability of the
6 display--I don't remember specific numbers now--
7 was to put alpha numeric characters on the screen
8 in conventional line-by-line fashion; that is, to
9 make a page of text on the screen. And the device
10 was used in conjunction with computers for time-
11 sharing applications to write and debug programs,
12 to retrieve information from a computer, to enter
13 information into the computer, to edit that infor-
14 mation either before or after it had been entered
15 into the computer, typical time-sharing terminal
16 computer applications.

1 Q Could it display anything other than
2 alpha numerics?

3 A Not except in the sense that one can make a
4 graphic entity by using a pattern of alpha numeric
5 characters. So one could create a graphical image
6 by putting zeroes and x's or other alpha numeric
7 characters in appropriate positions on the screen,
8 and from a practical point of view it would make no
9 sense, but the eye would perceive it as a graphical
10 entity.

11 Q Sir, do you know when that was first
12 offered for sale by RCA, if you know?

13 A I don't know the exact date. It was sometime
14 during the 1960's.

15 Q What is your best recollection, sir?
16 The latter part of the 1960's?

17 A My best recollection would be the mid-1960's,
18 '4, '5, '6.

19 Q Was that product developed at the RCA
20 Princeton Laboratories?

21 A No, it was not.

22 Q Could you tell me where it was developed?

23 A Yes. It was developed at Van Nuys, California,
24 at the RCA installation there. I don't remember
25 the exact designation of that division at that time.

1 Q Could the operator by exercising any kind
2 of manual control determine the location on the face
3 of this cathode ray tube as to where a particular
4 symbol or alpha numeric might be?

5 A Yes. There was a cursor, which was a small
6 horizontal line that appeared beneath the location
7 that the next character was to be entered. And the
8 operator could sequence that cursor through the
9 possible positions on the screen to locate the
10 position where he wished to place the next character
11 before striking the key that represented that
12 character.

13 Q If I use the phrase raster scan, would
14 you have any understanding as to what that meant
15 in conjunction with a cathode ray tube display
16 device?

17 A Yes, I would.

18 Q Could you tell me whether or not the
19 RCA model 70/752, I believe you said--

20 A Yes.

21 Q --used a raster scan?

22 MR. ANDERSON: I object to the question.

23 I think you should first let the witness
24 state what he understands a raster scan to mean.

25 MR. GOLDENBERG: I would be perfectly

1 happy to have him do that. I thank you for
2 your suggestion, Mr. Anderson.

3 Q Could you do that, sir?

4 A Yes, I could. Raster scan, in its usual
5 interpretation means a scanning pattern repetitively
6 of the beam on the screen, as is customarily done
7 in the television application of cathode ray tubes.
8 But in a more general sense, I believe most people
9 would interpret raster scan to mean a repetitive
10 tracing of the beam over the face of the screen in
11 accordance with a specific predetermined pattern.

12 Q Could you now tell me, on the basis
13 of that understanding of raster scan, did that
14 particular RCA apparatus use a raster scan display?

15 A In that sense, yes, it did. The beam started
16 at the upper left-hand corner. It followed a
17 complex motion that involves three sets of repetitive
18 inputs. It moved from left to right across a line.
19 And while it moved across the line, it was caused
20 to move up and down in a sinusoidal fashion a small
21 distance relative to that line. When it reached
22 the right-hand side of the screen, it would step
23 down a certain distance, go back to the left and
24 repeat that horizontal pattern with the small
25 vertical motion superimposed on it. It's something

1 that's sometimes referred to as a spot wobble type
2 scan, but it was a raster scan in that sense,
3 of the general definition of raster scan. But it
4 was not the specific raster scan pattern that's used
5 customarily in television.

6 MR. GOLDENBERG: We have no further
7 questions.
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RECROSS-EXAMINATION

BY MR. ANDERSON:

Q The spot wobble type of system, from what you said, it sounds something like the person would actually write, making letters across a line by going up and down and left and right, as required, but moving across one line of text at a time. Is that essentially correct?

A No. The spot wobble was a specific predetermined pattern that was invariant. It was sinusoidal, so that as the beam moved across it would move up and down repetitively tracing the motion that's mathematically described by the function sign of X. The beam would be intensified at certain points during that motion in accordance with the pattern of the character that was to be displayed at that location on the screen. So the raster scan part of it was a fixed repetitive pattern. It was never changed in any way with the characters that were being displayed. The only thing ~~that~~ was changed with the characters being displayed was the intensity of the beam at different points during its tracing of this raster scan motion.

MR. ANDERSON: I understand.

1 No further questions.

2 MR. GOLDENBERG: Mr. Lechner, thank you.

3 That completes your travail for the
4 morning.

5 [Witness excused.]
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1 MR. GOLDENBERG: Mr. Tripoli, may we have
2 the same understanding that Mr. Lechner's
3 signature will be waived, however, he will be
4 permitted to read the transcript and point out
5 to you anything that he believes was improperly
6 transcribed and recorded, and that you will
7 bring those to our attention and we will
8 attempt between ourselves, that is you, I
9 and Mr. Anderson, to agree upon those and to
10 enter them in some appropriate fashion.

11 MR. TRIPOLI: Yes, that is agreeable to
12 us.

13 MR. ANDERSON: That's fine. From what I
14 have seen, the corrections I have in mind,
15 just will be beyond contention. They don't
16 require any reinterpretation of the testimony.

17 MR. GOLDENBERG: We will carry the
18 original of the transcript and the original
19 exhibits to Chicago with us and take
20 responsibility for filing those in court.

21 MR. ANDERSON: That is acceptable.

22 MR. GOLDENBERG: With that, we are
23 finished.

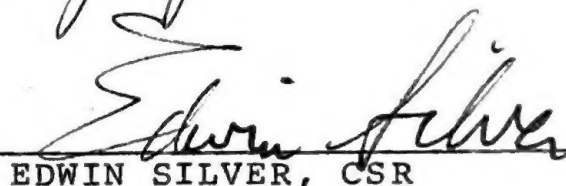
24 Thank you.

25 (The deposition was adjourned.)

CERTIFICATION

WE, GUY J. RENZI and EDWIN SILVER, Certified
Shorthand Reporters and Notaries Public of the
State of New Jersey, do hereby certify the foregoing
to be a true and accurate transcript of our original
stenographic notes taken at the time and place
hereinbefore set forth.


GUY J. RENZI, CSR


EDWIN SILVER, CSR

OCTOBER 28, 1976

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Re: Notice of Filing of Depositions
The Magnavox Company et al

v.

Chicago Dynamic Industries, Inc., et al
Civil Action Nos. 74 C 1030 and 74 C 2510

Gentlemen:

This will advise you that we have this day filed with the Clerk of the Court the ribbon copies of the following deposition transcripts taken in Trenton, New Jersey, October 26 and 27, 1976:

Alfred H. Teger

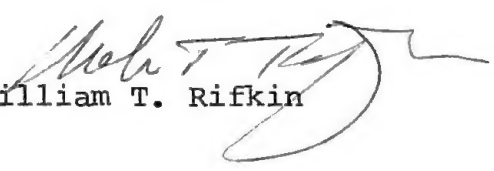
Harry L. Cooke

Bernard J. Lechner.

The depositions are filed subject to correction as agreed to by the parties.

Very truly yours,

WTR:ds


William T. Rifkin